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memo

TO: Steve Wright, (Columbia Falls Aluminum Company)

FROM: Luke Carlson PE, CFM Morrison-Maierle

DATE: 7/26/2017

JOB NO.: 5402.001

RE: Scour & Erosion of Storm Pond Earth Berm; Fall 2016 thru Summer 2017

CC:

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☒ **For Your Use**

In the summer of 2016 a steel sheet pile wall was installed at the upstream edge of the existing storm pond system on the right (north) bank of the Flathead River. The sheet pile wall was installed to prevent possible erosion and failure of the upstream end of an earthen dike which separates the storm water ponds from the Flathead River. Failure of the earthen dike could potentially release contaminants from the aluminum plant that were deposited in the storm water ponds.

In 2017 the Flathead River has continued a shift from primary conveyance along the south bank to the north bank due to riverine sediment transport and channel migration. Erosion of the existing earthen dike, upstream of the sheet pile wall, has progressed throughout the spring and summer. The Flathead River experienced a typical month-long high flow from early May thru early June. The average flow rates in the Flathead River during this period were on the order of the 2-year flood recurrence interval (50% Annual Chance) or approximately 36,000 to 46,000 cubic feet per second.

The earthen embankment is constructed on relatively clean rounded alluvial deposits with a typical gradation of one-foot minus materials. These alluvial deposits form the river bed two to three-feet above the base flow water elevation at the embankment location. The stream power of the Flathead River is sufficient to erode this material during the average annual high flow in the late spring and early summer. Thirty to forty feet of embankment was eroded away in the spring and summer of 2017. Most of this erosion occurred from the south end of the sheet pile wall to a distance of approximately 150 feet downstream along the bank. Additional erosion is expected to continue through the next month or two if the Flathead River follows the typical trend of hydrograph recession with minimum flow rates occurring in mid-winter.

As of July 21, 2017 erosion has exposed the southern edge of the sheet pile. Additional sheet piling may be exposed as erosion continues throughout the remainder of this summer and fall when the river flow rate exceeds seasonal low flows. It is likely that the exposed portion of the sheet pile is now within the area defined as the United States Army Corp of Engineers (USACE) Ordinary High Water Mark regulatory limits.